(2) $A_1 = relu(Z_1)$

$$relu(x) = \begin{cases} x & \text{if } x > 0 \\ 0 & \text{if } x <= 0 \end{cases}$$

$$= \begin{bmatrix} 12 & 4 \\ 2 & 16 \\ 13 & 2 \\ 0 & 1 \end{bmatrix}$$

$Z_{out} = W_{out} A_1 + b_{out} =$

$$\begin{bmatrix} 3 & -1 & 2 & -4 \\ 1 & -5 & -1 & 3 \end{bmatrix} \begin{bmatrix} 12 & 4 \\ 2 & 16 \\ 13 & 2 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 4 \\ -5 \end{bmatrix}$$

broadcasted!

$$= \begin{bmatrix} 64 & 0 \\ -16 & -80 \end{bmatrix}$$

$f_{out} = relu$

$A_{out} = f_{out}(Z_{out})$

$$= \begin{bmatrix} 64 & 0 \\ 0 & 0 \end{bmatrix}$$